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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/699,226 | 10/31/2003 | Hyungjun Kim | YOR920030208US1 | 3395 |
| 7590 | 05/31/2006 | | EXAMINER | |
| David Aker 23 Southern Road Hartedale, NY 10530 | | | CHEN, BRET P | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1762 | |
| DATE MAILED: 05/31/2006 | | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|-----------------------------------|--|
| Office Action Summary | Application No. 10/699,226 | Applicant(s) KIM ET AL. | |
| | Examiner B. Chen | Art Unit 1762 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/10/06.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3, 6-9, 11-19 and 26-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-9, 11-19, 26-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims 1-3, 6-9, 11-19, 26-28 are pending in this application. Amended claims 1-3, 6, 11, 13, 15-16; canceled claims 4-5, 10, 20-25; and newly added claims 26-28 are noted.

The amendment dated 3/10/06 has been entered and carefully considered. In view of said amendment, the 112 rejection and the previous art rejection have been withdrawn.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-3, 6-9, 11-19, 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arkles et al. (5,919,531). Arkles discloses a method of forming tantalum and tantalum-based films by chemical vapor deposition onto a substrate includes introducing into a deposition chamber: (i) a substrate; (ii) a source precursor in the vapor state; and (iii) at least one carrier gas, and maintaining the temperature of the substrate within the chamber as from about 70.degree. C. to about 675.degree. C. for a period of time sufficient to deposit a film comprising tantalum on the substrate (col.4 lines 19-33) followed by the deposition of a second film comprising tantalum to form a multilayered structure (col.4 lines 34-44). The deposition method can be a plasma method (col.5 lines 36-37), the plasma can contain hydrogen and nitrogen (col.12 line 66 – col.13 line 2), and tantalum pentachloride can be used as a precursor, albeit at a higher processing temperature (col.7 lines 19-49). A silicon substrate is utilized (col.5 line 67 – col.6 line 2) and can be used as a diffusion barrier (col.6 line 24). Arkles teaches a range of processing time, temperature, and pressures (col.8 lines 10-22 and col.12 lines 1-4) as

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well as the use of a carrier gas (col.11 lines 58-67). In one embodiment, a tantalum nitride layer can be formed followed by pure tantalum by varying nitrogen (col.9 lines 28-35) and can be done in alternating or sequential fashion (col.9 lines 47-53). However, the reference fails to explicitly teach reducing the concentration of nitrogen.

It is noted above that the reference specifically teaches of depositing pure tantalum film or tantalum nitride alloy film followed by a series of tantalum-based films, such as pure tantalum or tantalum nitride are deposited onto the coated substrate, preferably with increasing nitrogen concentrations. It is further noted that to form tantalum nitride films by plasma CVD, a nitrogen containing reactant gas must be introduced (col.12 lines 45-50) and that nitrogen is not utilized to form pure tantalum (col.12 lines 34-42). If one skilled in the art wanted to form the tantalum nitride layer first followed by the pure tantalum layer, then nitrogen would have to be eliminated as taught by Arkles. Hence, it would have been obvious to one skilled in the art to reduce the concentration of nitrogen to form a second pure tantalum layer as taught by Arkles.

The limitations of claims 2-3, 6-9, 11-19, 26-28 have been addressed above.

Response to Arguments

Applicant's arguments with respect to the pending claims have been considered but are moot in view of the new ground(s) of rejection.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

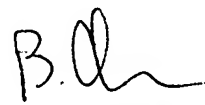
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to B. Chen whose telephone number is (571) 272-1417. The examiner can normally be reached on 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Bc
5/26/06


BRET CHEN
PRIMARY EXAMINER